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Comparison of Oral Microflora of Diabetic and Non-Diabetic Patients with Periodontitis

Reena Kulshrestha[1], A. Neral[2], T.S. Srinivasa[3] and Shama Afroze Baig[4]

[1]Deparment of Microbiology, [3]Department of Periodontology,
Rungta College of Dental Sciences and Research, Kohka - Kurud Road, Bhilai - 490 024, India.
[2]Department of Microbiology, Government Medical College, Raipur, India.
[4]Department of Microbiology, Government Eklavya College, Doundi-Lohara, Durg, India.

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A comparative study of Oral Microflora of Normal, Non-Diabetic and Diabetic Periodontitis Patients was carried out. It resulted in Microflora common in all types were gram positive facultative rods and cocci. In Normal patients Gram positive facultative anaerobic, fermenting cocci were predominant where as in Non -Diabetic with Periodontitis patient showed growth of microbiota that are gram negative and positive, capnophilic, motile and anaerobic rods and cocci belonging to members of genera *Streptococcus* and *Actinomyces*. But in patients with Diabetic and Periodontitis there were subsequent increase in Gram negative, obligate anaerobic, proteolytic, motile bacterial species. Numerous oral changes were seen in diabetic patients including alterations in the flora of oral cavity, greater predominance of *Candida albicans*, Hemolytic *Streptococci* and *Staphylococcus.* Total bacterial loads were more in Diabetic Periodontitis Patients than the microflora in Non- Diabetic with Periodontitis patients. Diabetes increases the risk and severity of periodontal diseases. Number and proportion of different periodontal pathogens were more in patients with Diabetes and Periodontitis. In Diabetic Periodontitis Patient, Periodontal therapy may have beneficial effects on glycemic control.

Key words: Oral Microflora, Diabetes, Periodontitis, Microorganisms.

As many as 600 different species that colonize the oral cavity can effect the delicate balance of host-bacterial interactions leading to health & disease[1]. Oral microbiota comprises of resident flora which are regularly present & when disturbed it re-establishes itself & transient flora that consist of pathogenic & non-pathogenic micro-organism[2,3]. Most members of the normal microbiota are generally non-pathogenic; however some may assume a pathogenic role when resistance of host is lowered. The normal microflora of the oral cavity is complex & consists of large number of species of Bacteria, Fungi & Protozoa because mouth has many distinct habitats including saliva & crevicular fluids, the surfaces of soft tissue such as lips, palate, cheek, tongue & gums & hard surfaces of teeth[4]. The presence of nutrients, epithelial debris, and secretions makes the mouth a favourable habitat for a great variety of bacteria. The oral bacteria exert microbial antagonism against non indigenous species by production of inhibitory substances such as fatty acids, peroxides and bacteriocins[5].

Periodontitis is defined as an inflammatory disease of the supporting tissues of the teeth caused by specific micro-organism or

* To whom all correspondence should be addressed.
Mob.: + 91 - 99774-71666
E-mail: baigshama92@gmail.com

group of specific micro-organism, resulting in progressive destruction of periodontal ligament & alveolar bone with pocket formation, recession or both[6]. Local & systemic factors can also modulate an individual's susceptibility to Periodontitis[1]. The relationship between diabetes & periodontal disease is clear from epidemiological research that diabetes increases the risk & severity of periodontal disease[7].

The Periodontium consists of the investing & supporting tissues of tooth: Gingiva – the main function is protecting the underlying tissues, the Attachment Apparatus-composed of periodontal ligament, Cementum & Alveolar bone[8]. The Periodontium is subject to morphologic & functional variations as well as changes associated with age[8].

Diabetes mellitus and periodontal disease have high incidence in the general population and are associated with various degrees of dysfunction in the immune system. Numerous oral changes have been described in diabetic patients, including alteration in flora of oral cavity[9, 10, 11, 12.] It has been shown that diabetic patients with severe periodontal disease have more complications of diabetes and less effective metabolic control compared with diabetic patients with healthy gingiva. Studies show a higher prevalence & severity of Periodontal disease in individuals with diabetes than in non-diabetic patients with similar local factors[10,13,14,15,16] .While diabetes is considered to be a risk factor for periodontal disease progression, few studies have demonstrated an association between the level of glycemic control and periodontal disease[17,18].

MATERIAL AND METHODS

Total 50 patients of both Diabetic & Non-Diabetic with case of Periodontitis from the OPD of RCDSR were analyzed for their oral microflora. The samples were taken by swabbing & then cultivated in Nutrient agar (Basal Media), Blood Agar (Enriched Media), Robertson Cooked Meat Media (Anaerobic media), Sabourauds Media.[19,20,21,22]After incubation period of 24 hrs the colonies were identified by Colony morphology, Gram Staining & Biochemical reactions[20, 22, 23].

RESULTS

Fewer coccal cells, more motile rods were found in diseased sites, but there was rise in Gram-negative bacteria in advanced Periodontitis. Cultivation of micro-organism from sites of chronic Periodontitis reveals high percentage of anaerobic bacteria and Gram negative bacterial species. Numerous oral changes were seen in diabetic patients such as predominance of *Candida sps.*, *Hemolytic Streptococci*, *Staphylococci*, *Porphyromonas sps.*, *Actinobacillus sps*. The number of bacteria determined by microscopic

Table 1. Types of Oral Microflora and their % in different groups of patients

S. No.	Oral Microflora	Healthy person	Diabetic without periodontitis	Diabetic with periodontitis
1.	*Streptococcus**	++	+++	++++
2.	*Staphylococcus*	++	+++	+++
3.	*Enterococcus*	+	++	+++
4.	*Enterobacteriaceae*	+	++	+++
5.	*Pseudomonas*	+	++	++
6.	*Lactobacillus**	++	+++	+++
7.	*Actinomycetes**	++	+++	++++
8.	*Bacteroides*	+	+++	++++
9.	*Fusobacterium*	+	++	+++
10.	*Eubacterium*	+	+++	+++
11.	*Candida**	++	+++	++++
12.	*Gram Positive Bacilli**	+	+++	++++
13.	*Porphyromonas**	+	++	+++

++++ = nearly 100 % , +++ = nearly 75%, ++ = nearly 50% , + = common (about 25%) * = potential pathogen

counts was twice as high in diabetic patients as in healthy sites. Microflora common in all types were gram positive facultative rods and cocci. Number and proportion of different periodontal pathogens were more in patients with Diabetes and Periodontitis (Table 1 & 2).

DISCUSSION

Early studies with appropriate microscopy clearly demonstrated that the number & proportion of different subgingival bacterial groups varied in periodontal health compared with the disease state[24,25,26]. The glucose content of gingival fluid & blood is higher in individuals with diabetes than in those without diabetes[27]. The increased glucose in the gingival fluid & blood of diabetic patient could change the environment of microflora & contribute to the severity of periodontal disease. The presence of nutrients, epithelial debris, and secretions makes the mouth a favourable habitat for a great variety of bacteria. The oral bacteria exert microbial antagonism against non indigenous species by production of inhibitory substances such as fatty acids, peroxides and bacteriocins. Glucose levels present in oral fluids may alter the presence of some organisms[27]. Organisms present in individuals with Type 1 appear to be composed of anaerobic flora. It is suggested that the severe periodontitis seen in diabetics is the result of a reduced host response to microorganisms that cause periodontitis rather than the type of microorganism present. Microorganisms that cause periodontitis and the host response to these may increase insulin resistance in diabetic patients.

Table 2. Gram Reaction shown by various microflora

S. No.	Oral Microflora	Gram Reaction	Morphology	Arrangement
1.	*Streptococcus*	Gram +ve	Coccus	Small chains
2.	*Staphylococcus*	Gram +ve	Coccus	Clusters
3.	*Enterococcus*	Gram +ve	Coccus	Single
4.	*Enterobacteriaceae*	Gram -ve	Bacillus	Single
5.	*Pseudomonas*	Gram -ve	Bacillus	Single
6.	*Lactobacillus*	Gram +ve	Bacillus	Single
7.	*Actinomycetes*	Gram -ve	Bacillus (Straight or curved with rounded ends)	Straight or curved with rounded ends
8.	*Bacteroides*	Gram -ve	Bacillus	Single
9.	*Fusobacterium*	Gram -ve	Bacillus (cigar shaped with pointed ends)	Single
10.	*Eubacterium*	Gram +ve	Bacillus	Single
11.	*Candida*	Gram +ve	Budding (yeast like)	-
12.	*Gram Positive Bacilli*	Gram +ve	Bacillus	Single
13.	*Porphyromonas*	Gram -ve	Cocco- Bacilli	Single

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